

PATENT ABSTRACTS OF JAPAN

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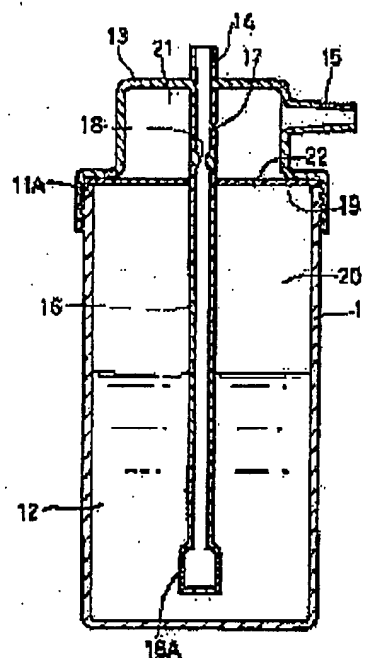
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(54) GAS HUMIDIFIER

(57)Abstract:

PROBLEM TO BE SOLVED: To appropriately hold gas humidity regardless of the change of the flow rate of gas and to generate bubbling.

SOLUTION: In this gas humidifier, a conductor 16 communicated to a flow-in port 14 is provided with a ventilation hole 17 for guiding oxygen to a flow-out port 15 without passing through humidifying water 12 and an orifice 18 for limiting the oxygen flowing to the humidifying water 12 when an oxygen supply amount is a large flow rate and securing the oxygen flowing through the humidifying water 12 at the time of a small flow rate. Thus, in the case that the oxygen of the large flow rate is supplied, the amount of the oxygen passing through the humidifying water 12 is limited by the orifice 18 provided inside the conductor 16 and the rise of oxygen humidity is suppressed. In the case that only the oxygen of the small flow rate is supplied, the oxygen flowing through the humidifying water 12 is secured by the orifice 18 and bubbling is generated.



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CLAIMS

[Claim(s)]

[Claim 1]A humidification bottle which consists of a cylinder-like-object-with-base object in which the upper part carried out the opening, and fills up a pars basilaris ossis occipitalis with humidifying water, A lid in which it was provided so that an opening of this humidification bottle might be lidded removable, and gaseous input and a tap hole were established, A lead pipe inserted and provided in a pars basilaris ossis occipitalis of a humidification bottle from input of this lid, and a vent which leads a gas to a gas flow exit without being provided in the upper part side of this lead pipe and letting humidifying water pass, An orifice which secures a gas which it is located in the downstream rather than this vent, and is provided in said lead pipe, and the amount of gas supplies restricts a gas which flows into humidifying water at the time of a large flow rate, and flows through humidifying water at the time of a small flow rate, It is located in the downstream rather than said vent, is provided in said humidification bottle, is provided in a divider plate which divides inside of said humidification bottle into high humidity space and low humidity space, and this divider plate, and open said high humidity space and low humidity space for free passage, and. A gas humidifier constituted from a communicating hole which restricts that a high humidity gas flows out of high humidity space into low humidity space.

[Claim 2]The gas humidifier according to claim 1 which an aperture of said vent, an orifice, and a communicating hole sets as a relation of a communicating hole > orifice > vent.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the gas humidifier which supplies to a patient the gas whose oxygen density is higher than air in the state where it humidified moderately.

[0002]

[Description of the Prior Art]The therapy which provides oxygen is performed to the patient of the respiratory system.

For example, the oxygen condensed with the oxygen enricher which consists of adsorbent, such as oxygen generated from an oxygen cylinder or a molecular sieve, is supplied to the patient using nose KANYURA, a mask, etc.

[0003]By the way, as for most oxygen supplied from an oxygen enricher, moisture is not contained. Therefore, when supplying oxygen to a patient's nostril, in order to prevent the inside of a nostril from drying, oxygen in the state where the humidifier was formed and humidified in the middle of the oxygen supply tube is supplied.

[0004]Here, 1 is a cylinder-like-object-with-base-like humidification bottle, as for this humidification bottle 1, the upper part side is that drawing 2 explains the humidifier by the 1st conventional technology with the opening 1A, and the pars basilaris ossis occipitalis is filled up with the humidifying water 2.

[0005]3 is a lid which lids the opening 1A of the humidification bottle 1 removable, and this lid 3 receives the opening 1A — airtightness and liquid — it is screwed densely. And the input 4 where the oxygen supplied from an oxygen supply flows is established in the center section of said lid 3, and the tap hole 5 where the humidified oxygen flows out is established in the flank.

[0006]In the humidifier by the 1st conventional technology constituted in this way. If oxygen is supplied to the humidification bottle 1 via the input 4 using a tube from an oxygen supply, within this humidification bottle 1, will humidify this oxygen, it will be made to flow out of the tap hole 5, and a patient's nostril will be supplied using nose KANYURA etc. which were provided at the tip of a tube.

[0007]However, in what is depended on the 1st conventional technology, since the oxygen which flowed in the humidification bottle 1 from the input 4 does not pass along the humidifying water 2, there is no feeling of BUKUBUKU by bubbling (generating of a bubble), and the sense of security of inhaling oxygen is not obtained.

[0008]Then, what is depended on the 2nd conventional technology shown in drawing 3 as a thing which makes bubbling cause by the oxygen which flows in a humidifier is known.

[0009]In drawing 3, 6 is a lead pipe as giving the same numerals to the same component as the 1st conventional technology, the upper part side is connected to the input 4 of the lid 3, the lower part side serves as the delivery 6A towards the pars basilaris ossis occipitalis in the humidification bottle 1, and this lead pipe 6 is elongating the inside of the humidifying water 2.

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[0010]In this 2nd conventional technology, in order to breathe out oxygen in the humidifying water 2 since the lead pipe 6 is used, and to flow out of the tap hole 5 after that, as for oxygen in the humidification bottle 1, humidity will be humidified to not less than about 90%.

[0011]For this reason, in the humidifier by this 2nd conventional technology, since the oxygen humidified to about 90% comes to circulate the inside of a tube, dew condensation arises within a tube and it becomes easy to generate waterdrop. By this, waterdrop enters in a patient's nostril, and displeasure is caused, and it is also insanitary.

[0012]Then, in order to stop the humidity of oxygen, what is shown in drawing 4 is known as the 3rd conventional technology.

[0013]In drawing 4, it is the vent by which 7 was provided in the upper part side of the lead pipe 6 as giving the same numerals to the same component as the 2nd conventional technology, and this vent 7 leads the oxygen supplied from the input 4 to the tap hole 5 without letting the humidifying water 2 pass.

[0014]In this 3rd conventional technology, the humidity of the oxygen supplied to a patient is controlled to the moderate value by supplying a part of oxygen through the humidifying water 2 from the lead pipe 6, and supplying a part of oxygen without letting the humidifying water 2 pass from the vent 7.

[0015]However, if the oxygen flow rates by which the humidifier by this 3rd conventional technology flows in in the humidification bottle 1 differ, the phenomenon [humidification rates differ and / bubbling] no longer generating will happen.

[0016]Then, an example is taken by the oxygen supplied to a patient being in the range of 0.25-3.00 l. / min, for example, When the aperture of the vent 7 made 1.00, 0.90, 0.80, 0.60, 0.40, and six kinds of different lead pipes 6 from 0.35 as an experiment and made it change in the range of said 0.25-3.00 l. of oxygen flow rates / min, the oxygen humidity in the humidification bottle 1 was measured. This result is as being shown in the following table 1. Table 1 surrounds and shows the oxygen humidity which hits the conditions as which generating of bubbling was not regarded by a thick line.

[0017]

[Table 1]

		酸素流量 (L/min)							
		3.00	2.50	2.00	1.50	1.00	0.75	0.50	0.25
通気孔の孔径 (mm)	1.00	72.0	71.5	68.0	60.9	61.0	57.3	59.8	79.2
	0.90	75.7	74.4	73.9	73.5	75.3	76.6	80.3	88.0
	0.80	77.4	76.8	75.5	73.5	70.2	72.0	78.0	86.4
	0.60	83.2	82.8	80.8	80.3	80.2	80.0	77.2	77.5
	0.40	86.7	86.5	85.3	85.5	84.8	85.0	84.5	83.9
	0.35	88.5	88.9	89.0	88.9	88.8	87.5	86.9	85.8
		酸素湿度 (%)							

[0018]And if the result of Table 1 is seen, when the aperture of the vent 7 is as large as 1.00 mm, an oxygen flow rate can obtain the moderate oxygen humidity around 70% on condition of a large flow rate comparatively with 2.00-3.00 l. / min. When an oxygen flow rate turns into a small flow rate below 1.5 l. / min, oxygen flows [no] out of the vent 7, and bubbling stops however, occurring.

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[0019]In the conditions whose apertures of the vent 7 are 0.9-0.4 mm, generating of bubbling was seen also on conditions with few oxygen flow rates as the aperture became small. However, generating of bubbling was not seen even when the oxygen flow rate decreased to 0.25 l. / min, and the aperture of the vent 7 was 0.4 mm.

[0020]When the aperture of the vent 7 was made small to 0.35 mm, the oxygen flow rate was able to see generating of bubbling on condition of [all the] 0.25-3.00 l. / min. However, if the aperture of the vent 7 is made small to 0.35 mm, the oxygen which passes along the humidifying water 2 from the lead pipe 6 will increase, and the humidity of oxygen will become high to about 90%.

[0021]

[Problem(s) to be Solved by the Invention]By the way, in the humidifier by the 3rd conventional technology mentioned above, even when the aperture of the vent 7 provided in the lead pipe 6 is set as 1.00 mm - 0.35 mm of any, there is a problem that rationalization of oxygen humidity and generating of bubbling cannot be reconciled over the range of all the oxygen flow rates.

[0022]It is in providing the gas humidifier this invention was made in view of the problem of the conventional technology mentioned above, and the purpose of this invention holds gas humidity properly regardless of change of a gaseous flow, and it enabled it to make generate bubbling.

[0023]

[Means for Solving the Problem]In order to solve a technical problem mentioned above, a gas humidifier which an invention of claim 1 adopts, A humidification bottle which consists of a cylinder-like-object-with-base object in which the upper part carried out the opening, and fills up a pars basilaris ossis occipitalis with humidifying water, A lid in which it was provided so that an opening of this humidification bottle might be lidded removable, and gaseous input and a tap hole were established, A lead pipe inserted and provided in a pars basilaris ossis occipitalis of a humidification bottle from input of this lid, and a vent which leads a gas to a gas flow exit without being provided in the upper part side of this lead pipe and letting humidifying water pass, An orifice which secures a gas which it is located in the downstream rather than this vent, and is provided in said lead pipe, and the amount of gas supplies restricts a gas which flows into humidifying water at the time of a large flow rate, and flows through humidifying water at the time of a small flow rate, It is located in the downstream rather than said vent, is provided in said humidification bottle, is provided in a divider plate which divides inside of said humidification bottle into high humidity space and low humidity space, and this divider plate, and open said high humidity space and low humidity space for free passage, and. It constitutes from a communicating hole which restricts that a high humidity gas flows out of high humidity space into low humidity space.

[0024]By having constituted in this way, a part of gas which flows from input of a lid circulates a lead pipe, and it is breathed out by humidifying water, and it flows into low humidity space through a communicating hole of a divider plate from high humidity space, generating bubbling. Other gases are breathed out by low humidity space, without passing along humidifying water from a vent. Thereby, in low humidity space, since a gas of low humidity breathed out from a vent and a gas of high humidity which passed along humidifying water join, it becomes a gas with moderate humidity and flows out of a tap hole.

[0025]When a gas of a large flow rate is supplied, many gases tend to turn inside of a lead pipe to humidifying water, and tend to flow through it, but since an orifice is provided in a lead pipe, this orifice can restrict a flow of a gas breathed out by humidifying water, and a rise of gas humidity can be prevented.

[0026]On the other hand, since a gas which flows into a lead pipe can be secured from input as a gas which flows through humidifying water by an orifice when a gas of a small flow rate is supplied, a gas can generate bubbling also a small flow rate.

[0027]Since inside of a humidification bottle is divided into high humidity space and low

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humidity space by a divider plate, it can restrict that a gas breathed out from a vent is humidified, and gaseous humidity can be stopped.

[0028]An aperture of said vent, an orifice, and a communicating hole has an invention of claim 2 in having set it as a relation of a communicating hole > orifice > vent.

[0029]When a gas of a small flow rate flows into a lead pipe from input by having set up in this way, since the aperture of an orifice is larger than a vent, a gas circulates a lead pipe, is breathed out by humidifying water, and generates bubbling. And since the aperture of a communicating hole is larger than an orifice, a gas which passed along humidifying water passes along a communicating hole without resistance from high humidity space, and flows into low humidity space. Therefore, even when a gas of a small flow rate is supplied, bubbling can be generated, and from a communicating hole established in a divider plate, a humidified gas can be circulated without resistance.

[0030]

[Embodiment of the Invention]Hereafter, the oxygen humidifier which humidifies oxygen as a gas humidifier by an embodiment of the invention is mentioned as an example, and is explained in detail according to an accompanying drawing.

[0031]11 are a humidification bottle which makes the outside of a humidifier among a figure, and this humidification bottle 11 is formed in the shape of [from which the upper part side serves as the opening 11A] a cylinder like object with base. In this humidification bottle 11, it fills up with the humidifying water 12 at the pars basilaris ossis occipitalis.

[0032]13 is the lid provided in the opening 11A of the humidification bottle 11 removable, the lower end side lids the opening 11A of the humidification bottle 11, and this lid 13 receives the opening 11A — airtightness and liquid — it is screwed densely.

[0033]The input 14 where oxygen flows protrudes on the center section of said lid 13, and this input 14 is connected to oxygen supplies, such as an oxygen enricher which consists of adsorbent, such as an oxygen cylinder or a molecular sieve, for example, via a tube (neither is illustrated). The tap hole 15 where the humidified oxygen flows into the flank of the lid 13 protrudes, and nose KANYURA, a mask (neither is illustrated), etc. are connected to this tap hole 15 via a tube.

[0034]16 is a lead pipe, the upper part side is connected to the input 14 of the lid 13, the lower part side develops towards the pars basilaris ossis occipitalis in the humidification bottle 11, and this lead pipe 16 serves as the delivery 16A within the humidifying water 12.

[0035]17 is the vent provided in the upper part side of the lead pipe 16, the opening of this vent 17 is carried out to the low humidity space 21 mentioned later, and the oxygen supplied from the input 14 by this is led to the tap hole 15 without letting the humidifying water 12 pass. The vent 17 serves as a byway rather than the communicating hole 22 and the orifice 18 which the aperture mentions later, for example, is set as about 0.35-0.50 mm.

[0036]This orifice 18 extracts the passage inside diameter of the lead pipe 16, and 18 is the orifice which was located in the downstream and provided in the lead pipe 16 rather than the vent 17, and it is set [the aperture is a byway from the communicating hole 22, and serves as a major diameter rather than the vent 17, for example,] as about 0.6-0.8 mm. And the orifice 18 restricts the amount of oxygen which flows into the humidifying water 12, when the amount of supply of the oxygen which flows from the input 14 is a large flow rate, and on the other hand, when the amount of supply of oxygen is a small flow rate, it has the function to secure the gas which flows through the humidifying water 12.

[0037]19 is the divider plate provided in the opening 11A side of the humidification bottle 11, rather than the vent 17, this divider plate 19 was located in the downstream, and the opening 11A was formed in wrap disc-like, and it has divided the inside of said humidification bottle 11 into the high humidity space 20 by the side of the humidifying water 12 (below), and the low humidity space 21 by the side of the lid 13 (above). This shuts up oxygen [high humidity / near / by the humidifying water 12 / the saturation water vapor pressure] in the high humidity space 20, and a humidity rise of the oxygen breathed out by the low humidity space 21 from the vent 17 is restricted.

[0038]It is a communicating hole which 22 is provided in the divider plate 19 and opens the high humidity space 20 and the low humidity space 21 for free passage, and this communicating hole 22 restricts that high humidity oxygen in the high humidity space 20 flows into the low humidity space 21 side automatically. The aperture of the communicating hole 22 is set as the grade which does not give resistance, and about 1.8-2.2 mm, when the oxygen which is a major diameter and was breathed out in the humidifying water 12 from the lead pipe 16 rather than the vent 17 and the orifice 18 circulates to the low humidity space 21 side.

[0039]Therefore, at this example, it is an aperture of the vent 17, the orifice 18, and the communicating hole 22, [0040]

[Equation 1]It is set as the relation of the communicating hole 22> orifice 18> vent 17.

[0041]The oxygen humidifier by this example has the composition like ****, and explains [next] that oxygen in a humidifier flows.

[0042]First, if oxygen dry via a tube from an oxygen supply is supplied, this oxygen will flow in the lead pipe 16 from the input 14 established in the lid 13. And a part of oxygen supplied is breathed out by the low humidity space 21, without passing along the humidifying water 12 from the vent 17. Other oxygen circulates the lead pipe 16, is breathed out by the humidifying water 12 from the delivery 16A, and generates bubbling with this humidifying water 12. And oxygen which passed along the humidifying water 12 flows into the low humidity space 21 through the communicating hole 22 of the divider plate 19 from the high humidity space 20.

[0043]Therefore, in the low humidity space 21, since dry oxygen breathed out from the vent 17 and oxygen of high humidity which passed along the humidifying water 12 join, oxygen has about 40 to 70% of moderate humidity, for example, and flows out of the tap hole 15. Oxygen moderately humidified from the tap hole 15 by this can be supplied to a mask etc. via a tube, and dew condensation within a tube can be prevented.

[0044]When oxygen of a large flow rate is supplied to the input 14, much oxygen tends to turn inside of the lead pipe 16 to the humidifying water 12, and tends to flow through it. However, in this example, since the orifice 18 is formed in the lead pipe 16, a flow of oxygen breathed out by the humidifying water 12 by this orifice 18 can be restricted. A rate of dry oxygen breathed out from the vent 17 and humidification oxygen which passed along the humidifying water 12 can be held moderately by this, and even when oxygen of a large flow rate is supplied, a rise of oxygen humidity can be prevented.

[0045]On the other hand, when oxygen of a small flow rate is supplied to the input 14, almost all oxygen tends to flow into the low humidity space 21 through the vent 17. However, in this example, since an aperture of the orifice 18 is formed in a major diameter rather than an aperture of the vent 17, distribution resistance can circulate oxygen which flows in the lead pipe 16 from the input 14 to the small orifice 18 side. Thereby, even when only oxygen of a small flow rate is supplied, by the orifice 18, oxygen which flows through the humidifying water 12 can be secured, and bubbling can be generated in the humidifying water 12. Oxygen can be humidified with the humidifying water 12.

[0046]Since inside of the humidification bottle 11 is divided into the high humidity space 20 and the low humidity space 21 by the divider plate 19, oxygen breathed out from the vent 17 can be prevented from being humidified by oxygen [high humidity / near the saturation water vapor pressure], and humidity of oxygen which flows out of the tap hole 15 can be stopped moderately.

[0047]Since the communicating hole 22 established in the divider plate 19 is formed in a major diameter rather than the vent 17 and the orifice 18, oxygen can be circulated from the high humidity space 20 without resistance to the low humidity space 21, and plugging of the communicating hole 22 can be prevented.

[0048]Here, oxygen humidity when an aperture of 0.4 mm and the orifice 18 is set as 2.0 mm and an aperture of 0.7 mm and the communicating hole 22 changes an aperture of the vent 17 like the 3rd conventional technology mentioned above in the range of 0.25-3.00 l. of oxygen flow rates / min was measured. This result is as being shown in the following

table 2, and surrounds and shows oxygen humidity which hits conditions as which generating of bubbling was not regarded by a thick line.

[0049]

[Table 2]

	酸素流量 (L/min)							
	3.00	2.50	2.00	1.50	1.00	0.75	0.50	0.25
通気孔の孔径 0.4mm オリフィスの孔径 0.7mm 連通孔の孔径 2.0mm	64.7	63.8	62.6	60.8	57.2	54.0	39.1	6.5
	酸素湿度 (%)							

[0050] And when a result of Table 2 was seen, an oxygen flow rate was able to generate bubbling in the wide range of 0.50–3.00 l. / min. However, only in the case of a small flow rate, generating of bubbling was not dramatically regarded for an oxygen flow rate as 0.25 l. / min.

[0051] When seen about oxygen humidity, an oxygen flow rate was able to humidify oxygen to 40 to 70% used as moderate humidity in the wide range of 0.50–3.00 l. / min.

[0052] In this way, when oxygen of a large flow rate is supplied according to this example, When restrict quantity of oxygen which passes along the humidifying water 12, and a rise of oxygen humidity is suppressed by the orifice 18 provided in the lead pipe 16 and only oxygen of a small flow rate is supplied, by the orifice 18, oxygen which flows through the humidifying water 12 can be secured, and bubbling can be generated.

[0053] As a result, since the oxygen humidified moderately can be stabilized and supplied to a patient, generating bubbling, without being related to change of a flow, dew condensation within a tube can be prevented, a sanitary aspect can be improved, and the reliability over an oxygen humidifier can be improved.

[0054] By dividing the inside of the humidification bottle 11 into the high humidity space 20 and the low humidity space 21 by the divider plate 19, the humidity of the oxygen breathed out from the vent 17 can be stopped moderately, and oxygen of moderate humidity can be supplied to a patient.

[0055] Although the case where the aperture of 0.6–0.8 mm and the communicating hole 22 was set [the aperture of the vent 17] as 1.8–2.2 mm for the aperture of 0.35–0.50 mm and the orifice 18 was mentioned as the example and said example explained it, This invention is set up not only in this, these apertures are suitably set up with the size of the humidification bottle 11, etc., and it is not limited to the thing of an example.

[0056]

[Effect of the Invention] The vent which leads a gas to a gas flow exit without letting humidifying water pass to the lead pipe which is open for free passage to input according to the invention of claim 1, as explained in full detail above, The amount of gas supplies restricted the gas which flows into humidifying water at the time of a large flow rate, provided the orifice which secures the gas which flows through humidifying water at the time of a small flow rate, and had composition which divides the inside of a humidification bottle into high humidity space and low humidity space by a divider plate. This breathes out a part of gas which flows from the input of a lid from a lead pipe to humidifying water, and it can be made to flow into low humidity space through the communicating hole of a divider plate from high humidity space, generating bubbling. The regurgitation of the other gases can be carried out to low humidity space, without passing along humidifying water from a vent.

[0057] Therefore, since the gas of the low humidity breathed out from the vent and the gas of the high humidity which passed along humidifying water can be made to join, it can be

made to flow out of a tap hole in low humidity space, where moderate humidity is given to a gas.

[0058] Since the flow of the gas breathed out by humidifying water can be restricted and the rise of gas humidity can be prevented by the orifice provided in the lead pipe when supplying the gas of a large flow rate, generating of dew condensation can be prevented and improvement in a sanitary aspect can be aimed at.

[0059] On the other hand, since the gas which flows into a lead pipe can be secured from input as a gas which flows through humidifying water by an orifice and bubbling can be generated when only the gas of a small flow rate is supplied, a gaseous flow can be viewed and sense of security can be given to a patient.

[0060] The inside of a humidification bottle is divided into high humidity space and low humidity space by a divider plate, and since the gas breathed out from the vent can be prevented from being humidified by the gas [high humidity / near the saturation water vapor pressure], gaseous humidity can be stopped.

[0061] According to the invention of claim 2, when the gas of a small flow rate flows into a lead pipe from input, the regurgitation of this gas can be carried out to humidifying water through an orifice with a larger aperture than a vent, and bubbling can be generated. And the communicating hole where an aperture is larger than an orifice can be made to flow into low humidity space through the gas which passed along humidifying water without resistance. Therefore, even when the gas of a small flow rate is supplied, the humidified gas can be made to flow out of a tap hole, where bubbling is generated.

[Translation done.]